Whole body computed tomography during trauma resuscitation—Effect on survival

S. Huber-Wagner[a,*], R. Lefering[b], L.M. Qvick[a], M. Körner[a], W. Mutschler[a], K.-G. Kanz[a]

[a] *Ludwig-Maximilians-University, Germany*
[b] *University Witten/Herdecke, Germany*

Introduction: An increasing number of trauma centres uses whole body computed tomography (WBCT) as a diagnostic tool for the early, primary trauma survey. There is no evidence to date suggesting that use of WBCT has a significant effect on the outcome of major trauma patients.
Methods: In a retrospective, multicentre study we compared the probability of survival (Ps) in those blunt trauma patients who received WBCT during resuscitation to those who did not. Using data derived from the Trauma Registry of the German Trauma Society, we determined the Ps according to the trauma and injury severity score (TRISS), the revised injury severity classification score (RISC) and the standardized mortality ratio (SMR, observed/expected mortality).
Results: 1494 (32.3%) of the identified 4621 patients received WBCT. The mean age was 42.6 years, 72.8% were male and mean ISS was 29.7. SMR calculated by TRISS was 0.745 (CI95% 0.633–0.859) for the WBCT vs. 1.023 (CI95% 0.909–1.137) for the non-WBCT group ($p < 0.001$). RISC-score calculation revealed a SMR of 0.865 (CI95% 0.774–0.956) for the WBCT vs. 1.034 (CI95% 0.959–1.109) for the non-WBCT group ($p = 0.017$), respectively. This means that the observed mortality rates in the WBCT-group are significantly lower than predicted by the TRISS/RISC. Multivariate adjustment for hospital level, year of trauma and potential centre effects confirmed that WBCT is an independent predictor for survival ($p \leq 0.002$). The "number needed to scan" is 17 based on TRISS and 32 based on RISC calculation.
Discussion: Integration of WBCT into early trauma care significantly increases the P_s of polytrauma patients. The relative reduction of the mortality rate based on the TRISS is 25% (CI95% 14–37%) and 13% (CI95% 4–23%) based on the RISC. Despite potentially harmful effects of increased radiation exposure WBCT is recommended as a standard diagnostic tool during early resuscitation phase of polytrauma patients (Lancet, in press).
Keywords: Whole body computed tomography; Polytrauma; Outcome; Resuscitation

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6B.3

Influence of proanthocyanidin on blunt traumatized lungs after mustard gas exposure (battle imitated environment)

O. Yucel, H. Caylak, A. Gozubuyuk*, O. Genc

Gulhane Military Medical Academy, Turkey

Chemical agents are used to amplify the injurious power of the destroying weapons. Because of its significant effects on respiratory system, chemical warfare is extremely relevant to trauma-dealing medical staff too. The objective of the present study was to investigate the role of oxidative stress status in blunt chest trauma coexisting mustard toxicity and to determine the protective effect of proanthocyanidine.

In this study, animals were divided into four groups and each group contained fifteen rats. The first one was the control group (CG). The second one was the proanthocyanidin group (PCG). Vapourized 5 ml distilled water was applied to CG and PCG for to blunt chest trauma and then to a toxic dose of NM. The fourth group (TNMPCG) was subjected to blunt chest trauma and NM and besides PC was administrated as in the second group. All of the rats were sacrificed after 72 h and lungs were removed immediately. Two samples were taken from the lungs, one of which was fixed in 2.5% buffered glutaraldehyde for histopathological examination and the other was kept in liquid nitrogen for histochemical analysis. Superoxide dismutase (SOD), glutathion peroxidase (GSH-Px), catalase (CAT), malonedialdehyde (MDA) was measured from the histochemical samples.

Light micrographs of the PCG were normal in appearance, similar to the CG findings. Furthermore, light micrographs of the TNMPCG were normal in appearance, similar to the CG findings, too. MDA levels, CAT and GSH-Px activities in PCG were similar to CG. NM direct exposure caused increased MDA levels, and decreased GSH-Px and SOD activity significantly in lung tissue. PC treatment decreased MDA levels, but CAT and GSH-Px activities were similar to those of TNMG group.

These findings can imply that the structural changes induced by blunt traumatized lungs after mustard gas exposure can be partially prevented and restored by PC treatment.
Keywords: Blunt chest trauma; Chemical warfare agent; Pulmonary contusion; Proanthocyanidin

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6B.4

Developing a spinal clearance protocol for unconscious paediatric trauma patients

L.S. Hutchings*, R. Atijosan, C. Burgess, K. Willett

John Radcliffe Hospital, UK

Introduction: Spinal injury in paediatric trauma is associated with significant morbidity and mortality. An increasing evidence base has allowed consensus on effective methods of spinal clearance in the adult and the low-risk paediatric patient. No such literature exists for the high-risk paediatric trauma patient.
Methods: A retrospective study of 115 consecutive children with major trauma admitted to the Paediatric Intensive Care Unit of a UK trauma unit between January 2000 and December 2006 was performed. Data was collated from medical charts, intensive care records, and hospital administration and imaging systems, on spinal imaging and methods of spinal clearance.
Results: The patients in the study were predominantly male (63%) and injured in a road traffic accident (63.5%). Ten patients (8.7%) were identified with spinal injuries, all of whom had sustained closed head injuries. Two of these patients had spinal cord injuries. Patients with spinal injuries had longer intubation times and intensive care stays, but no differences in New Injury Severity Score or outcome. Clearance methods ranged from clinical examination to plain radiographs, computed tomography (CT), and dynamic screening. CT demonstrated 100% specificity and sensitivity with positive and negative predictive values of 1 for all spinal regions. There were no cases of Spinal Cord Injury WithOut Radiological Abnormality (SCIWORA) and no missed injuries. Magnetic Resonance Imaging (MRI) was used in the presence of neurological abnormality only.
Discussion: This study will contribute to the development of an evidenced-based protocol for the clearance of the spine in the obtunded high-risk paediatric trauma patient. All spine regions must be imaged and have formal documented clearance. High resolution CT with sagittal and coronal reconstructions, interpreted by

an expert radiologist, should be the current basis for cervical spine clearance. The role of MRI in routine clearance remains undetermined.
Keywords: Paediatric; Spinal injury; Trauma; Clearance

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6B.5

Damage control orthopaedics—Are plastic surgeons aware of the concept?

E. Wilson[a], A. Ardolino[b,*], I. Pallister[c]

[a] *Norfolk and Norwich Hospital, UK*
[b] *Dorset County Hospital, UK*
[c] *Morriston Hospital, UK*

Introduction: There has been increasing evidence over the past decade advocating a damage control approach and suggesting that early total care may in fact be harmful in certain patient groups. As more information on the physiology of trauma patients becomes available, a review of the treatment of the trauma patient is required. Based on clinical and biochemical markers, patients who are too unwell to cope with a second-hit of surgery are identified and treated via a damage control approach. This depends on a through understanding of trauma physiology, occult hypoperfusion and the immunoinflammatory response to injury. This second questionnaire builds on our previous results presented at the BTS Trauma conference in 2007.
Methods: A questionnaire has been devised and presented to plastic surgery consultants and registrars across multiple regions. The questionnaire was designed to determine whether the indications for damage control orthopaedics are understood. In the context of a clinical scenario clinical and biochemical parameters are presented. The participants are asked when they would adopt a damage control approach and tick the five most applicable parameters. This is repeated for early total care. This will determine which criteria are used by the participants to guide treatment and give an indication of their understanding of the physiological response to injury.
Results: The results of all questionnaires have not yet been fully analysed. Preliminary review indicates that damage control orthopaedics is not entirely well understood.
Conclusion: A knowledge of orthopaedic and trauma concepts is vital for the plastic surgeon to know in order to plan and execute the most efficient reconstruction possible. We will discover whether the more modern philosophy of damage control orthopaedics has permeated into clinical practice. The study will give an indication of how polytrauma patients are treated and whether this is based on an awareness of the immunoinflammatory response.
Keywords: Damage control orthopaedics; Plastic surgery; Immunoinflammatory response to trauma; Early total care

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6B.6

CT scanning to assess fracture fusion reduces the need for subsequent surgery in conservatively managed atlanto-axial fractures

A.J. Highcock*, D. Cohen, L. Moulton, K. Rourke, M. de Matas, R. Pillay

Royal Liverpool University Hospital, UK

Introduction: The management of patients with atlanto-axial fractures, including those of the odontoid peg, remains controversial. Both current management strategies of prolonged rigid immobilization and operative fixation carry significant risks, particularly in the elderly. Assessment of fusion is vital in guiding management decisions but there is no consensus on how this is best achieved. We used CT scanning to assess union in non-operatively managed patients with C1 and C2 fractures, examining whether CT scanning demonstrated union more effectively than plain radiographs alone, thereby improving outcomes and lowering the proportion of patients requiring operative procedures.
Method: We retrospectively analyzed all patients admitted with C1 or C2 fractures between 2001 and 2007. All fractures were initially managed in either halothoracic vest (85%) or Aspen collar (15%). Union was assessed with CT scanning. Functional stability was assessed with flexion-extension radiographs four weeks after CT. Outcomes measured were: progression to union; time in halo; complications related to rigid immobilization; and failure of non-operative management.
Results: Twenty-seven patients were studied, 15 males and 12 females, average age 55.1 years. Nineteen had odontoid peg fractures (10 type II; 9 type III). The remainder consisted of three Hangman's, three lateral mass and two atlas ring fractures. 83% of patients progressed to union at an average of 13.2 weeks (range 5–22). Complications related to halo immobilization included three skull perforations and three pin site infections. All six of these patients progressed to union non-operatively. Failure of non-operative management was deemed as non-union or poor patient tolerance of halo, and occurred in four patients (17%). All four had type II odontoid peg fractures managed in halo within 2 days of presentation (one patient presented 52 days after initial injury) and all had C1–C2 transarticular screw fixation. One post-operative complication of non-union was recorded.
Conclusion: Non-union rates of atlanto-axial fractures have been reported as high as 34% using flexion-extension radiographs. In our series, CT imaging identified a significantly lower rate of non-union and therefore the need for surgery (p-value = 0.046 using Chi squared t-test). Non-operative management with CT scanning to assess fracture union, rather than plain radiographs alone, should be considered in patients with C1 and C2 fractures.
Keywords: C-spine fractures; CT; Conservative management

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6B.7

Needle tip position and injection site in lumbar selective nerve root blocks: A prospective audit of accuracy of the procedure

A.L. Khan*, D. Fender, M.J. Gibson, P.L. Sanderson

Newcastle General Hospital, UK

Introduction: Needle tip position in selective lumbar nerve root blocks (SLNRBs) has been correlated with outcome, pain relief, complication rate, and neural distribution of contrast. No previous study prospectively assesses the position of the needle tip and procedural accuracy, nor its ability to isolate injectate around the exiting nerve root.
Method: Prospective evaluation of consecutive selective nerve root blocks performed by a single surgeon utilising a consistent surgical technique. Location of injectate in relation to the foraminal and pedicle anatomy was determined by an independent observer.
Results: Of needle tips positioned lateral to the middle third of the superior pedicle on the AP view, 45 of 51 flowed into the nerve sheath alone, and 6 flowed into both the nerve sheath, and spinal canal. Two were due to a larger volume of contrast injected, two due to needle migration and two due to the presence of marked lumbar scoliosis. Of tips located below the middle third of the pedicle, 2 of 29 flowed into the nerve sheath alone, 2 flowed into the canal alone, and 25 flowed into both. Of those placed medial to zone below the